

# "POINTOLITE" LAMPS

Fig. 1  
10 c.p. for  
Direct Current.



Fig. 2—100 c.p. for Alternating Current.



Fig. 3—500 c.p. for Direct Current.



Fig. 4—100 c.p. for Direct Current.

**JAMES G. BIDDLE CO.**

ELECTRICAL and SCIENTIFIC INSTRUMENTS

1211-13 ARCH STREET, PHILADELPHIA, PA.

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# **"Pointolite" Lamps**

## **Some Applications and Results**

*A Professor of Physics.*

"... we have used our Pointolite Lamps partly for lecture-room projections and partly for studying the molecular scattering of light. They have so far given us very satisfactory results."

*A Chemical Laboratory.*

"One of our Pointolite Lamps is used for photomicrography ... The other lamps are used in connection with a Judd-Lewis sector photometer and are giving satisfactory service."

*Research Dept. of a Wire & Cable Co.*

"... our experience with these lamps extends many years back ... and in our use they lasted four years each practically. We have been using them as a point source of light for photomicrography."

*A Professor of Physics.*

"It gives me great pleasure to say that our Pointolite Lamp has given eminent satisfaction in the work for which we purchased it, i.e. for use with the lecture-room galvanometer. We find it vastly superior to the Nernst filament, the arc, and all other illuminants which we have tried."

*Chief Chemist of an Alcohol Plant.*

"... we have used this lamp as a source of light for a polarimeter, in determining sugar by the Clerget method. Such solutions are still strongly colored in spite of clarification, and the 'Pointolite' lamp has proved satisfactory for this work."

*An Instructor in Psychology.*

"... I am glad to report that it (the 'Pointolite' Lamp) was satisfactorily used as the basic light source for photographic recording of human eyelid reactions by means of the Dodge pendulum photochronograph. One of the lamps has been used in similar photographic recording for several years, and has been found thoroughly dependable and durable."

*A Manufacturer of Motor Trucks and Tractors.*

"... in regard to the 500 c.p. 'Pointolite' Lamp outfit ... this lamp was used in connection with the Dorsey Phonelescope for studying sound."

*A Professor of Physics.*

"This lamp has been used in our laboratory for a variety of purposes where a concentrated brilliant source was required; as for example, for use with the optical bench in the interference and diffraction phenomena ... and for use with deflecting mirror devices."

*A U. S. Government Laboratory.*

"We use the lamp for general projection use in polarizing light and in photo-elastic study."

*A Hospital Dept. of Biochemistry.*

"The 'Pointolite' which we purchased from you has been used for dark field illumination with satisfaction."

*An Astronomical Observatory.*

"The Pointolite (1000 c.p.) we are using with a 3-foot army search light mirror and are much pleased with the combination. It is more satisfactory than a 2000 c.p. lamp of the ordinary type."

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## "POINTOLITE" LAMPS

"POINTOLITE" LAMPS produce an intensely brilliant and remarkably white light from a very small source, which is perfectly steady, gives an evenly distributed field of illumination, and requires no attention after starting. The name "Pointolite" was coined from the term "point of light," because the light emanates from a small electrode which can be placed and will remain in the focus of a reflector or an optical system approximately as if it were an actual mathematical point.

"Pointolite" Lamps have an important application as a source of light in conjunction with laboratory and scientific apparatus such as—microscopes (visual and photographic); galvanometers; oscillographs; photometers, spectrophotometers, polarimeters and other optical instruments; for special photographic and projection work, and also in connection with radio transmission of photographs. They are used by scientific workers in laboratories of Physics, Chemistry, Biology, Psychology, Medicine, Botany, Mineralogy, Geology, and Mechanical and Electrical Engineering. The lamps are made in various candle-power sizes as listed on page 8.

### Description:

The "Pointolite" Lamp is in effect an arc-incandescent lamp. An arc is formed and maintained between refractory conducting electrodes in an atmosphere of inert gas at relatively low pressure inside of a sealed glass bulb. The electrodes are rendered incandescent by the action of the arc and thus serve as sources of light; the arc itself is practically non-luminous. The electrodes are tungsten, and by shaping them in the form of a bead, plate or target and operating them at suitable temperatures, they become highly concentrated sources of light. The exact form of the electrodes varies with the ratings of the lamps as described below.

The principle of operation is quite simple, as shown in Fig. 5, and described in the following paragraphs. All "Pointolite" Lamps must be operated in conjunction with special sockets and suitable ballast resistances and switching devices (A, B and S of Fig. 5).

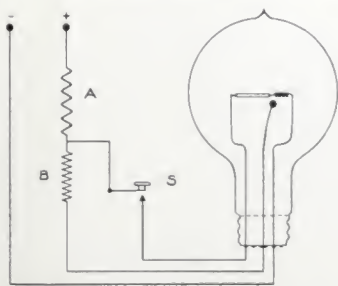


Fig. 5—Electrical circuit for 30 and 100 c.p. "Pointolite" Lamps showing the principle of operation of all "Pointolite" Lamps.



These are conveniently arranged in the form of control devices for use on circuits of standard rated voltage described on page 6.

### Two-Electrode D. C. Lamps, 30 and 100 C. P.:

The two-electrode "Pointolite" Lamp contains a positive electrode in the form of a tungsten bead or globule mounted on a stem of the same material and a negative electrode known as the "ionizer" in the form of a tungsten spiral ending in a straight portion upon which is threaded a tube composed of a mixture of tungsten and thorium oxide. These electrodes are enclosed in a glass bulb filled with nitrogen at a low pressure.

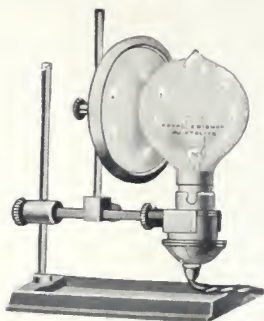


Fig. 6—Cat. No. 810, 100 c.p. D. C. "Pointolite" Lamp with stand, adjustable clamp and reflector.



Fig. 7—Cat. No. 800, 30 c.p. D. C. "Pointolite" Lamp.

The positive electrode is connected to the source of supply through the ballast resistance A B, Fig. 5. One end of the ionizer also is connected to the positive source of supply through a push-switch and a portion A of the ballast resistance. The other terminal of the ionizer is connected through the control unit directly to the negative pole of the supply.

### Starting the Arc:

Closing the push-switch S for four or five seconds causes current to flow through the ionizer which becomes incandescent and ionizes the gas in its vicinity. If the arc does not form within a few seconds after releasing the switch, the leads from the supply should be interchanged so as to reverse polarity.

The arc first takes place between the ionizer spiral and the tungsten globule, and then—as the lamp attains its normal operating temperature—it shifts over from the spiral on to the ionizer tube. The spiral portion of the ionizer, while suitable for starting the arc, is not designed to withstand the action of the arc for any great length of time. On the other hand, the ionizer tube is not suitable for starting the arc, but is most efficient as a negative electrode when the arc is formed between it and the globule.

The matter of shifting the arc is achieved in the 30 c.p. lamps by proper spacing of the electrodes. In the 100 c.p. lamp the stem of the positive tungsten globule is mounted on a thermostatic strip which causes the tungsten bead to be moved over as the lamp becomes heated. This feature operates in a thoroughly satisfactory manner and makes for greatly increased length of life. The bead of course remains in a fixed position while the lamp is in operation.

### Three-Electrode D. C. Lamps, 500 and 1000 C. P.:

The three-electrode higher candle power lamps are similar to the two-electrode type, but have in addition to the tungsten globule and the ionizer a third tungsten electrode in the shape of a plate mounted on a tungsten stem. The arc is first formed between the ionizer as negative and the globule as positive electrode as in the 30 and 100 c.p. lamps, with the plate entirely out of circuit. Then, by further manipulation of the control switches, the arc is "changed over," the bead becoming a new negative and the tungsten plate the new positive electrode. Most of the light is emitted from the tungsten plate which, at normal operating voltage, is entirely and brilliantly incandescent. The negative globule also is incandescent and furnishes an appreciable amount of light, but the rated candle power of the three-electrode lamps is always the plate candle power. All of the electrodes in the three-electrode lamps remain in a fixed position.

### Alternating Current Lamp, 150 C. P.:

The A. C. "Pointolite" Lamp has two tungsten bead electrodes of approximately the same size, and an ionizer is provided for starting the arc. By manipulating the control switches the ionizer is rendered incandescent, as in the three-electrode D. C. lamps, and the arc is first formed between it and one of the tungsten globules. By a second manipulation of the switchgear, the ionizer is disconnected from the circuit and the second bead is left as the only possible second electrode of the arc, which accordingly forms and maintains between the two globules. The two globules are equally bright and either or both may be used as sources of light. All of the electrodes remain in a fixed position. The A. C. "Pointolite" Lamp operates quite satisfactorily on all ordinary frequencies and has a high power-factor.



Fig. 8—Cat. No. 860, 150 c.p. A. C. "Pointolite" Lamp

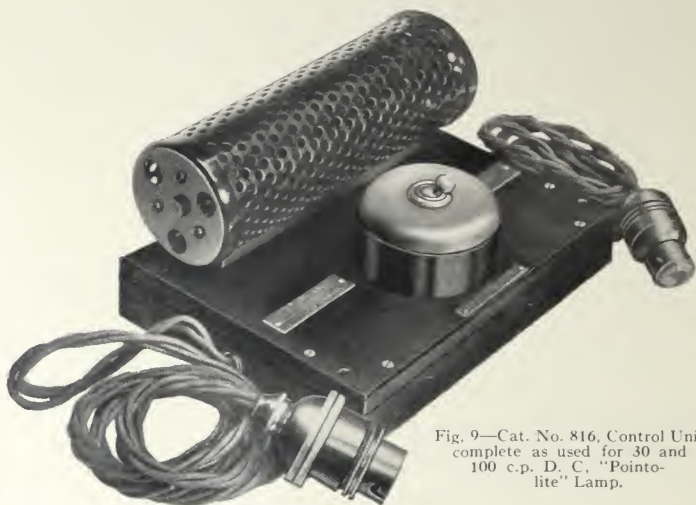


Fig. 9—Cat. No. 816, Control Unit complete as used for 30 and 100 c.p. D. C. "Pointolite" Lamp.

### Control:

The characteristics of the "Pointolite" arc permit of operating the lamps—through suitable ballast and series resistances\*—from any supply voltage between 60 and about 260 volts. Control units are therefore designed for the 30 and 100 c. p. lamps with interchangeable tubular resistance elements so that the same lamp may be operated from one or more different supply voltages. Also the same control unit base may be used for 30 or 100 c. p. lamps; it is merely necessary to select the proper resistance element, see page 8. The complete control unit includes also an attachment plug, flexible cord, switch and special "Pointolite" Lamp socket—ready to be connected and operated. The unit may be mounted on table or wall, see Fig. 9.

As larger capacity resistances are required for the higher candle-power lamps control boxes have been designed to include these resistances and necessary switching devices. These are usually arranged for operating the lamps from two or more different voltages by means of the insertion of a two-pin plug in one of two or more receptacles on the control box corresponding to the voltage of the supply.

To operate "Pointolite" Lamps at normal brilliancy, care should be taken that the voltage of the supply is within plus or minus 5% of the rating of the control device, or plug receptacle in use, in connection with the larger lamps. Increasing the supply voltage increases the brilliancy—due to increased temperature—until finally the bead becomes molten. The lamps may be operated at voltages higher than normal only at a sacrifice in the life of the lamps. Operating them at voltages lower than normal will lengthen the life, but the brilliancy will be reduced.

It is not practicable to run more than one lamp from one control device at the same time. New lamps can be supplied when needed.

### Characteristics:

The following tabulation shows the electrical and physical characteristics of "Pointolite" Lamps. The figures given are the normal ratings of the lamps and must not be considered as rigid and observable under all conditions.

\* Ballast resistance is required because the arc has a negative volt-ampere characteristic (i.e.—as the current in the arc is reduced by lowering the supply voltage, the voltage across the arc increases). Additional series resistance is included where the supply voltage exceeds 60 so as to limit the current in the arc to the proper value.



The intrinsic brilliancy of "Pointolite" Lamps can be varied over a wide range, as already indicated, by controlling externally the current in the lamp. Further particulars regarding this will be given on request.

While the intrinsic brilliancy of the "Pointolite" Lamp is not as great as that of the carbon arc lamp, it has advantages over the latter in that the light is perfectly steady in intensity and fixed in position and requires no attention when in operation. This is particularly helpful in photographic work because, even though a somewhat longer exposure may be required, the field of illumination is entirely under control.

Size of Lamp	Supply Voltage	Size of Bulb	Size of Globule (or Plate)	Intrinsic Brilliancy (C.P. per Sq. in.)	Ionizer		1st Arc		2nd Arc		Efficiency Lamp only (Watts per C. P.)
					Volts	Amperes	Volts	Amperes	Volts	Amperes	
30 C. P.	60—260	1½x2"	.070 to .075"	12000	11	4.5	45	.45	—	—	0.675
100 C. P.	60—260	3"	.098 to .102"	12000	11	7.0	45	1.35	—	—	0.60
500 C. P.	90—260	4"	Plate 0.25 sq. in.	8000	11	7.0	45	2.0	50	5.0	0.5
1000 C. P.	90—260	6"	Plate 0.355 sq. in.	8000	11	7.0	45	3.5	50	8.0	0.4
150 C. P. A. C. Lamp	90—260	3"	.098 to .102"	9000	11	7.0	50	2.0	50	2.0	.67

Fig. 10—Electrical and physical characteristics of "Pointolite" Lamps.

**Life:** The normal life of a "Pointolite" Lamp when operated properly should be approximately 500 hours—although we can offer no positive guarantee in this respect.

An important feature contributing to the maintenance of rated candle-power during the life of the lamps is the provision of a glass cup of particular shape and size which is welded to the inside of the glass bulb over the arc.\* The convection currents of hot gases from the arc rise to the center of the cup and descend down the side of it, forming a deposit of tungsten on the wall of the cup instead of the glass bulb. Thus the blackening of the bulb is greatly retarded. This feature also checks the volatilization of the electrodes by keeping them surrounded by an atmosphere of tungsten vapor. This is the reason why "Pointolite" Lamps should be supported in the upright position; they will operate, however, in other positions.

**Installing and Operating:** The lamps and control boxes are shipped practically ready for operation, it being necessary only to connect with supply, of proper voltage and polarity, place the lamp in the special socket provided and mount the latter in a convenient support with the lamp in upright position—base down. The operating instructions which accompany each lamp are very simple and if followed intelligently no trouble should be experienced. After the final arc is started the lamp should burn continuously without further attention until the current is turned off at the main switch.

\* This is included in all except the 30 c.p. D. C. lamp.

**Note:**—All of the direct current "Pointolite" Lamps are regularly supplied with special Edison screw bases requiring special sockets. The 150 c.p. A. C. lamp is made only with a special bayonet base requiring a special bayonet socket. These types are carried in stock.

The 30 and 100 c.p. D. C. lamps are made also with bayonet type bases for special bayonet sockets and are available upon special request, but at slight delay since we do not carry them in stock.

All of the control devices are equipped with standard Edison screw plugs for attachment to supply.

## PRICE LIST

## "Pointolite" Lamps and Control Devices

*(Each lamp requires a control device for starting and operating.**When ordering please state voltage of circuit  
from which lamp is to operate.)*

Cat. No.		Price
800	30 c.p. D.C. "Pointolite" Lamp.....	\$15.00
810	100 c.p. D.C. "Pointolite" Lamp.....	15.00
816	Control Unit for either 30 or 100 c.p. lamp, complete, including base (No. 816B) with attachment plug and cord, switch, flexible lead and special socket; and one resistance element as selected from the following list, 817a to 818b.....	35.00
817a	Resistance Element for 30 c.p. lamp, 110 volt circuit.....	14.25
817b	Resistance Element for 30 c.p. lamp, 220 volt circuit.....	14.25
818a	Resistance Element for 100 c.p. lamp, 110 volt circuit.....	14.25
818b	Resistance Element for 100 c.p. lamp, 220 volt circuit.....	14.25
816b	Base only, with attachment plug and cord, switch, flexible lead and special socket.....	20.75
820	500 c.p. D.C. "Pointolite" Lamp.....	25.00
825	Control Box for 500 c.p. "Pointolite" Lamp, with attachment plug, switch, special socket and flexible cord. For 100, 110 and 120 volts.....	95.00
826	Control Box for 500 c.p. "Pointolite" Lamp, with attachment plug, switch, special socket and flexible cord. For 200, 220 and 240 volts.....	125.00
830	1000 c.p. D.C. "Pointolite" Lamp.....	35.00
835	Control Box for 1000 c.p. "Pointolite" Lamp, with attachment plug, switch, special socket and flexible cord. For 100, 110 and 120 volts.....	135.00
836	Control Box for 1000 c.p. "Pointolite" Lamp, with attachment plug, switch, special socket and flexible cord. For 200, 220 and 240 volts.....	147.50
860	150 c.p. A.C. "Pointolite" Lamp.....	15.00
865	Control Box for 150 c.p. alternating current "Pointolite" Lamp, with attachment plug, switch, special socket and flexible cord. For 100, 110, 120, 220 and 240 volts.....	55.00

## ACCESSORIES AND PARTS

Cat. No.		Price
870	Reflector for 30, 100 and 150 c.p. lamps.....	\$18.75
875	Stand and adjustable clamp for 30, 100 and 150 c.p. lamps.....	6.75
876	Stand and adjustable holder for 500 c.p. lamp.....	5.25
877	Stand and adjustable holder for 1000 c.p. lamp.....	5.40
878a	Special socket and triple cord for 30 and 100 c.p. D. C. lamps (Edison screw type, as regularly supplied with Control Unit No. 816).....	6.25
878b	Special socket, triple cord and four-pin plug for 500 and 1000 c.p. D. C. lamps (Edison screw type, as regularly supplied with Control Boxes Nos. 825, 826, 835 and 836).....	8.75
879	Special socket, triple cord and four-pin plug for 150 c.p. A.C. lamp (Bayonet type, as regularly supplied with Control Box No. 865).....	9.00